Guidehouse
Outwit Complexity

Gas Optimization Program Impact Evaluation Report

Energy Efficiency Plan: Program Year 2022 (1/1/2022-12/31/2022)

Prepared for:

Peoples Gas and North Shore Gas

FINAL

June 22, 2023

Prepared by:

Hang Zhang
Guidehouse

Deborah Swarts
InCA

Roger Hill
InCA

Submitted to:

Peoples Gas
North Shore Gas
200 East Randolph Street
Chicago, IL 60601

Submitted by:

Guidehouse
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Ed Balbis
Partner
561.644.9407
ebalbis@guidehouse.com

Stu Slote
Director
802.526.5113
stu.slote@guidehouse.com

Laura Agapay-Read
Associate Director
312.583.4178
laura.agapay.read@guidehouse.com

Charles Ampong
Associate Director
608.446.3172
charles.ampong@guidehouse.com

.

Table of Contents

List of Tables and Equations

1. Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2022 Gas Optimization programs and a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendices present the impact analysis methodology and Illinois total resource cost (TRC) inputs. Program year 2022 covers January 1, 2022, through December 31, 2022.

2. Program Description

The Gas Optimization program provides a technical assessment service where energy advisors and contracted engineering firms review commercial, industrial, or public sector facilities for operation and maintenance issues that, if corrected, often provide short payback projects. In addition to identifying low-cost and no-cost measures that can be implemented by the customer, Gas Optimization studies also identify capital improvement projects. Incentives to complete recommended improvements include reimbursement for the cost of the technical assessment, rebates, and program implementation support. Projects identified through the Gas Optimization Program include steam pipe insulation, HVAC control optimization, heat recovery repair, process improvements, and other energy saving measures. The PGL program had 14 participants in 2022 and completed 15 projects, as shown in Table 2-1.

Table 2-1. 2022 Volumetric Summary for PGL

Participation	Private	Public	Total
Gas Optimization Program			
Participants *	13	1	**14**
Installed Retrofits †	14	1	**15**

* Participants are defined as unique project IDs
† Installed Retrofits are defined as unique retrofit for each participant
Source: Peoples Gas tracking data *and Guidehouse evaluation team analysis.*

The NSG program had one participant in 2022 and completed one public sector projects, as shown in Table 2-2.

Table 2-2. 2022 Volumetric Summary for NSG

Participation	Private	Public	Total
Gas Optimization Program			
Participants *	0	1	**1**
Installed Retrofits †	0	1	**1**

* Participants are defined as unique project IDs
† Installed Retrofits are defined as unique retrofit for each participant
Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the PGL Gas Optimization Program achieved by path in 2022.

Table 3-1. 2022 Annual Energy Savings Summary for PGL

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	97,724	100%	97,766	0.94	91,900
Public	41,352	100%	41,352	0.94	38,871
Total or Weighted Average	**139,076**	**100%**	**139,118**	**0.94**	**130,771**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG): A deemed value. Available on the Stakeholders Advisory Group (SAG) website: https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/.
Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Table 3-2 summarizes the energy savings the NSG Gas Optimization Program achieved by path in 2022.

Table 3-2. 2022 Annual Energy Savings Summary for NSG

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	0	-	0	0.94	0
Public	76,696	76%	58,458	0.94	54,951
Total or Weighted Average	**76,696**	**76%**	**58,458**	**0.94**	**54,951**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-gross (NTG): A deemed value. Available on the Stakeholders Advisory Group (SAG) website: https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/.
Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

4. Program Savings by Measure

The Gas Optimization Program does not offer prescribed measures. The measures included Table 4-1 and Table 4-2 have been manually characterized by the evaluation team. The realization rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings for a sample of the Gas Optimization Program projects. Realization rate findings for individual sampled projects are provided in Appendix B.

Table 4-1. 2022 Annual Energy Savings for PGL

Program Path	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Boiler Condensate Recovery	44,865	100%	44,865	0.94	42,173
	HVAC Custom	30,263	100%	30,287	0.94	28,470
	Space Conditioning Controls	22,223	100%	22,240	0.94	20,906
	Waste Heat Recovery	372	100%	373	0.94	350
Public	Boiler Condensate Recovery	41,352	100%	41,352	0.94	38,871
Total or Weighted Average		**139,076**	**100%**	**139,118**	**0.94**	**130,771**

Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Table 4-2. 2022 Annual Energy Savings by Measure for NSG

Program Path	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Public	Space Conditioning Controls	76,696	76%	58,458	0.94	54,951
Total or Weighted Average		**76,696**	**76%**	**58,458**	**0.94**	**54,951**

Source: North Shore Gas tracking data and Guidehouse team analysis.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the unit therm savings and realization rate findings by measure from the evaluation team's review. The realization rate is the ratio of the verified savings to the ex ante savings. Following the table are findings and recommendations. 0 provides a description of the impact analysis methodology and sampling approach. Appendix B provides the verification findings and realization rates for each sampled project. Appendix C provides the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (Therms/unit)	Verified Gross (Therms/unit)	Realization Rate	Data Sources
PGL Gas Optimization	Project	Vary	Vary	100%	Project File Review, History Billing Data, Telephone and Email Verification of Site Specific Data*; IL-TRM v10.0†
NSG Gas Optimization	Project	76,696	58,458	76%	Project File Review, History Billing Data

* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas; extracted March 07, 2023. Project files and billing data provided by Peoples Gas and North Shore Gas. Site-specific data collected by Guidehouse.
† Source of inputs for some non-site-specific data. Illinois Statewide Technical Reference Manual version 10.0 from http://www.ilsag.info/technical-reference-manual.html.

5.2 Findings and Recommendations

The evaluation team found the largest deviation from ex ante savings were in seven Space Conditioning Controls retrofits. The detailed realization rates and evaluation findings for individual sampled projects are provided in Appendix B. General findings and recommendations follow.

Finding 1. Ex ante savings for five Space Conditioning Controls projects (9219323, 9219464, 9219585, 9219357 and 9219479) were based on weather data from O'Hare airport. The evaluation team updated to use weather data from Midway airport, which is closer to the project sites and better represents that local climate.

> **Recommendation 1.** Select weather data that best reflects project location.

Finding 2. For Space Conditioning Controls project 9225451, the calculation analysis included several temperature bins with heating loads below zero in both baseline and post implementation cases. These negative heating loads indicated cooling was going on in these temperature bins. The verified savings were adjusted to exclude such temperature bins from the analysis.

> **Recommendation 2.** In the temperature bin analysis to calculate gas heating savings, exclude temperature bins with negative heating loads.

5.3 Historical Realization Rates and Net-to-Gross (NTG) Values

Table 5-2 shows the historical gross realization rates and NTG values for the Gas Optimization Program.

Table 5-2. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
2018	95%	NA	1.02	1.02
2019	102%	100%	0.91	0.91
2020	100%	100%	0.91	0.91
2021	100%	100%	0.91	0.91
2022	100%	76%	0.94	0.94

* NA, not applicable, no completed projects.
Source: Guidehouse evaluation research.

Appendix A. Impact Analysis Methodology

The evaluation team conducted desk file reviews to verify the Gas Optimization project savings that were not based on measures specified in the Illinois Statewide Technical Reference Manual (IL-TRM). Projects were randomly selected through a stratified sample design at the tracking record level using the population gross therm savings determined from program tracking data. The PGL sample was placed into two strata as shown in Table A-1. Table A-2 provides the PGL sample precision analysis and roll up realization rate to the population. The verified gross realization rate for PGL was 100% at a 1% relative precision at a 90% confidence interval. NSG completed a single project which was reviewed as a census with a verified gross realization rate of 76%.

Table A-1. Profile of Gross Impact Sample for PGL Projects

Population Summary				Sample Summary		
Program	Sampling Strata	Number of Projects (N)	Ex Ante Gross Savings (Therms)	n	Ex Ante Gross Savings (Therms)	Sampled % of Population (% Therms)
PGL Gas Optimization	1	2	86,217	2	86,217	100%
	2	12	52,859	7	42,903	81%
Total or Weighted Average		**14**	**139,076**	**9**	**129,120**	**93%**

Source: Guidehouse evaluation team analysis.

Table A-2. Relative Precision at 90% Confidence Level for PGL

Program	Strata	Relative Precision + or -%	Mean RR	Standard Error
PGL Gas Optimization	1	0%	100%	0.00
	2	1%	100%	0.01
Total RR (90/10)		**1%**	**100%**	**0.00**

Source: Guidehouse evaluation team analysis.

A.1 Engineering Review of Project Files

For each selected project sample, an in-depth application review was performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, the evaluation team estimated verified gross savings based on the review of documentation and engineering analysis.

To support this review, the implementation contractor provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), pre-inspection reports and photos, post inspection reports and photos, and calculation spreadsheets. There were no site visits in the

2022 evaluation. Communications through emails and phone calls with the customer were conducted to collect site specific information.

Appendix B. Impact Analysis Supplemental Information

Table B-1 provides a summary of verification results and adjustments for the PGL sampled projects. As indicated above, the roll up of the sample results to the population produced 100% gross realization rate for PGL.

Table B-1. 2022 PGL Summary of Sample M&V Results

Project ID	Measure	Realization Rate	Comments
3463804	Process - Waste Heat Recovery - PG C&I Custom Opt 2022	100%	No adjustment
8365446	Process - Boiler Condensate Recovery - PG Public Custom Opt 2022	100%	No adjustment
9091991	HVAC - Boiler Condensate Recovery - PG C&I Custom Opt 2022	100%	No adjustment
9225451	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	97%	Excluded the calculated heating loads below zero from the temperature bin analysis since they represent cooling load.
9219323	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	109%	Adjusted the occupancy hours based on received trend data. Updated to used Midway weather data. Claimed the more conservative results of the two provided calculation methodologies.
9219464	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	94%	Updated to used Midway weather data.
9219585	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	110%	Updated to used Midway weather data. Two methodologies were submitted for review; the FE version did not correctly represent the measure and was not used for the claimed savings in the ex post calculations.
9219357	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	104%	Updated to used Midway weather data.
9219479	HVAC - Space Conditioning Controls - PG C&I Custom Opt 2022	111%	Updated to used Midway weather data. Adjusted the occupancy hours based on received trend data.

Source: Evaluation analysis of program data.

Table B-2 provides a summary of verification results and adjustments for the NSG sampled project.

Table B-2. NSG Summary of Sample M&V Results

Project ID	Measure	Realization Rate	Comments
8463150	HVAC - Space Conditioning Controls - NSG Public Custom Opt 2022	76%	The equipment winter air flows, operating hours, AC units % outdoor air, and discharge air temperatures were updated based on evaluator's communication with the site contact.

Source: Evaluation analysis of program data.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1 and Table C-2 show the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to the evaluation team later. Guidehouse will include annual and lifetime water savings, and greenhouse gas reductions in the end of year summary report.

Table C-1. Verified Cost Effectiveness Inputs – PGL

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Private	Waste Heat Recovery	Project	1	15.0	44,865	44,865	42,173
	Space Conditioning Controls	Project	10	10.9	30,263	30,287	28,470
	Boiler Condensate Recovery	Project	1	10.0	22,223	22,240	20,906
	HVAC Custom	Project	1	15.0	372	373	350
Public	Boiler Condensate Recovery	Project	1	15.0	41,352	41,352	38,871
Total or Weighted Average			**14**	**13.3**	**139,076**	**139,118**	**130,771**

Source: Peoples Gas tracking data and Guidehouse evaluation team analysis.

Table C-2. Verified Cost Effectiveness Inputs – NSG

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Public	Space Conditioning Controls	Project	1	9.0	76,696	58,458	54,951
Total or Weighted Average			**1**	**9.0**	**76,696**	**58,458**	**54,951**

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.